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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/874,666	06/05/2001	Suresh Ramalingam	42390P7045D	6757

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EXAMINER
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GRAYBILL, DAVID E

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 10/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Applicati n No.</b>	<b>Applicant(s)</b>	
	09/874,666	RAMALINGAM ET AL. 	
	<b>Examiner</b>	<b>Art Unit</b>	
	David E Graybill	2827	

-- The MAILING DATE of this communication appears on the cover sheet with the corresponding address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7-14 and 31-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7-14 and 31-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 June 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |                                                                                                         |                                                                             |
|---------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                    | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____                                    |

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7-21-3 has been entered.

The reply filed on 7-32-4 is not fully responsive to the prior Office Action because the 35 U.S.C. 112, second paragraph rejection of claim 13 has not been addressed. See 37 CFR 1.111.

Because the response appears to be bona fide, but through an apparent oversight or inadvertence the response is incomplete, and in order to continue to afford applicant the benefit of compact prosecution, the requirement to complete the response within a one month time limit is waived, the amendment is entered, and the claims are examined on the merits.

Applicant is respectfully requested to scrutinize the claims and correct any additional errors.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, all of the features specified in claims

7-14 and 31-35 must be shown or the feature canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

The use of the trademarks SEMICOAT 5230-JP and SEMICOAT 122X is noted in this application. They should be capitalized, or the description of the marks otherwise indicated, wherever they appear, and be accompanied by the generic terminology. See MPEP 608.01(v).

The specification is objected to as being insufficient because proper identification of the product sold under the trademarks SEMICOAT 5230-JP and SEMICOAT 122X is omitted from the specification and such identification is deemed necessary under the principles set forth supra.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 7-14 and 31-35 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not

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described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The undescribed subject matter of the claimed invention is the claim 7 limitation, "the second material having a lower adhesive property than the first material," and the claims 11 and 32 limitation, "the second material having a lower adhesion property than the first material."

To determine adequacy of written description for original claims MPEP 2163IIA2(a) (redacted) instructs:

(i) For Each Claim Drawn to a Single Embodiment Or Species:

(A) Determine whether the application describes an actual reduction to practice of the claimed invention.

(B) If the application does not describe an actual reduction to practice, determine whether the invention is complete as evidenced by a reduction to drawings or structural chemical formulas that are sufficiently detailed to show that applicant was in possession of the claimed invention as a whole.

(C) If the application does not describe an actual reduction to practice or reduction to drawings or structural chemical formula as discussed above, determine whether the invention has been set forth in terms of distinguishing identifying characteristics as evidenced by other descriptions of the invention that are sufficiently detailed to show that applicant was in possession of the claimed invention.

(1) Determine whether the application as filed describes the complete structure (or acts of a process) of the claimed invention as a whole.

(2) If the application as filed does not disclose the complete structure (or acts of a process) of the claimed invention as a whole, determine whether the specification discloses other relevant identifying characteristics sufficient to describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize applicant was in possession of the claimed invention. Any claim to a species that does not meet the test described under at least one of (a), (b), or (c) must be rejected as lacking adequate written description under 35 U.S.C. 112, para. 1.

ii) For each claim drawn to a genus:

The written description requirement for a claimed genus may be satisfied through sufficient description of a representative number of species by actual reduction to practice (see i)(A), above), reduction to drawings (see i)(B), above), or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional

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characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genus (see i)(C), above).

Regarding claims 7-14 and 31-35, the instant application does not describe an actual reduction to practice of the claimed invention; the invention is not complete as evidenced by a reduction to drawings or structural chemical formulas that are sufficiently detailed to show that applicant was in possession of the claimed invention as a whole; the invention has not been set forth in terms of distinguishing identifying characteristics as evidenced by other descriptions of the invention that are sufficiently detailed to show that applicant was in possession of the claimed invention; the application as filed does not describe the complete structure of the claimed invention as a whole; and the specification does not disclose other relevant identifying characteristics sufficient to describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize applicant was in possession of the claimed invention.

The instant application does not describe sufficient description of a representative number of species by actual reduction to practice, reduction to drawings, or by disclosure of relevant, identifying characteristics, i.e., structure or other physical and/or chemical properties, by functional

characteristics coupled with a known or disclosed correlation between function and structure, or by a combination of such identifying characteristics, sufficient to show the applicant was in possession of the claimed genus.

The undescribed subject matter of the claimed invention is also the claim 31 negative limitation, "dispensing a second material only around a periphery of the integrated circuit." Any negative limitation or exclusionary proviso must have basis in the original disclosure. See *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) *aff'd mem.*, 738 F.2d 453 (Fed. Cir. 1984). The mere absence of a positive recitation is not basis for an exclusion. In particular, there is no original disclosure that the second material cannot be dispensed around more than or other than the periphery of the circuit. Moreover, in the specification, at page 8, lines 13-15, applicant discloses that the second material is dispensed around other than the periphery of the circuit, such as around the first underfill material.

Claims 7-14 and 31-35 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the disclosed species wherein the first material is SEMICOAT 5230-JP and the second material is SEMICOAT 122X, does not reasonably provide enablement for the claim 7 genus limitation, "the second material having a lower adhesive property than the

first material," and the claims 11 and 32 genus limitation, "the second material having a lower adhesion property than the first material." The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims without undue experimentation. The claimed genus is not enabled because the material is claimed in terms of its properties and functions, and there is no disclosed or otherwise known correlation or relationship between the properties and functions of the material genus and its composition or structure. To further clarify, although it is disclosed that the particular material species SEMICOAT 5230-JP and SEMICOAT 122X have the claimed properties and functions, there is no disclosure that the claimed properties and functions define a particular film composition species or genus. In addition, the invention involves unpredictable chemical reactions, and absent a statement applicable to the genus as a whole, it is indeterminable from the disclosure of the particular species what other species will work; hence, it is indeterminable what other species are members of the genus. As a result, a person skilled in the art could not make the material genus as a whole without undue experimentation. Chemical reactivity is a most unpredictable and empirical art and it is well settled that the



requirement that the claims be commensurate in scope with the enabling disclosure is particularly stringent in this area of technology. See *In re Doumani* 126 USPQ 408, *In re Grant* 134 USPQ 248, *In re Fisher* 166 USPQ 18, *Mobil Oil Corporation v. W. R. Grace and Company* 180 USPQ 418, *In re Slocombe* 184 USPQ 740, *In re Mercier* 185 USPQ 774, *Corona Cord Tire Company v. Dovan Chemical Corporation* 192 CD 255 and *In re Hawkins* 174 USPQ 157.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7-14 and 31-35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 7-10 are incomplete because claim 7 omits an essential structural cooperative relationship of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationship is the cooperative relationship between the second material and the remaining claimed structure. To further clarify, the limitation, "dispensing a second material acting as a circumferential fillet" does not define a

cooperative structural relationship between the second material and the remaining claimed structure.

In claim 7 the scope of the limitation "adhesive property," and in claims 11 and 31 the scope of the limitation "adhesion property" is indeterminable because there is no art recognized definition of material properties *adhesive* and *adhesion*, and these properties are not otherwise explicitly defined in the disclosure.

Relatedly, in claim 7 the scope of the limitation "having a lower adhesive property than the first material," and in claims 11 and 31 the scope of the limitation "having a lower adhesion property than the first material" is indeterminable because there are no art recognized quantifiable material properties *adhesive* and *adhesion*, and a quantification of these properties is not otherwise disclosed. To further afford applicant the benefit of compact prosecution, it is suggested that this rejection might be overcome if applicant limits the claims to particular adhesive or adhesion units; i.e., particular adhesive and adhesion quantities, defined and adopted by convention, with which other particular adhesive and adhesion quantities of the same kind can be compared to express their value. Examples of such units are peel strength and peel resistance expressed in Kg/mm as defined in ASTM standard D 903-98 and ASTM standard D

1876-01, respectively. See also "Bynel Adhesive Resin, Series 1100 Including 1123, 1124, and 11E573 Modified Ethylene Vinyl Acetate, Adhesive Evaluation." 2003: n. pag. Dupont 27 Sep. 2003 <<http://www.dupont.com/industrial-polymers/bynel/H-68911/H-68911.html>>.

In claims 7 and 11 the scope of the limitation "acting as a circumferential fillet," in claim 31 the scope of the limitation "to act as a circumferential fillet," and in claims 7, 11 and 31 the scope of the limitation "acting as underfill" is indeterminable because the metes and bounds of the exemplary terms "as a circumferential fillet" and "as underfill" are not defined and cannot otherwise be determined. See MPEP § 2173.05(d). Moreover, applicant does not define how a circumferential fillet and an underfill acts, and one skilled in the art would not otherwise know how a circumferential fillet and an underfill acts. To further clarify, it is unclear how the language "acting as" and "to act as" further limits the scope of the language "a circumferential fillet," and how the language "acting as" further limits the scope of the language "underfill."

In claim 13 there is insufficient antecedent basis for the language "said partially gel state."

In claims 34 and 35 the scopes of the limitations "a temperature ranging between . . ." are unclear because the term ranging appears to be contextually grammatically incorrect.

In the rejections infra, reference labels are generally recited only for the first recitation of identical claim language.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 7, 8 and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Asai (6376906).

At column 1, lines 18-55, Asai teaches the following:

A process for underfilling an integrated circuit that is mounted to a substrate, comprising: dispensing a first material 9 (at other than portion "A") acting as underfill which becomes attached to the integrated circuit 7 and the substrate 1; and, dispensing a second material 9 (at portion "A") acting as a circumferential fillet, the second material having a lower adhesive property than the first material, wherein the first material flows between the integrated circuit and the substrate,

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wherein the second material is dispensed in a pattern which surrounds the first material.

Claims 7, 8, 10-14 and 31-35 are rejected under 35 U.S.C. 102(b) as being anticipated by Ameen (0340492).

At column, 8, line 6 to column 16, line 33, Ameen teaches the following:

A process for underfilling an integrated circuit that is mounted to a substrate, comprising: dispensing a first material ("undercoat" in space 41) acting as underfill which becomes attached to the integrated circuit 4 and the substrate 12; and, dispensing a second material 44 acting as a circumferential fillet, the second material having a lower adhesive property than the first material, wherein the first material flows between the integrated circuit and the substrate, wherein the second material is dispensed in a pattern which surrounds the first material.

A process for underfilling an integrated circuit that is mounted to a substrate comprising: heating the substrate 12 before a first material is dispensed; dispensing the first material 41 acting as underfill, the first material becoming attached to the integrated circuit 4 and the substrate; and, dispensing a second material 44 acting as a circumferential fillet, the second material having a lower adhesion property

than the first material and becoming attached to the integrated circuit and the substrate, further comprising heating the first material to a gel state, wherein the substrate is heated to a temperature "160C" that is greater than a temperature "80C" for heating said first material to said partially gel state and mounting the integrated circuit to the substrate with a solder bump 28 before the first material is dispensed.

A process for underfilling an integrated circuit that is mounted to a substrate comprising: heating the substrate before a first material is dispensed; dispensing the first material acting as underfill, the first material becoming attached to the integrated circuit and the substrate; and, dispensing a second material only around a periphery of the integrated circuit to act as a circumferential fillet, the second material having a lower adhesion property than the first material and becoming attached to the integrated circuit and the substrate, further comprising heating the first material to a gel state, wherein the substrate is heated to a temperature that is greater than a temperature for heating the first material to a partially gel state, wherein the first material is heated to a temperature ranging between 120 degrees Celsius to 145 degrees Celsius, wherein the dispensing of the second material is at a

temperature "80-100C" ranging between 80 degrees Celsius and 120 degrees Celsius.

To further clarify the teaching of heating the first material to a gel state, this process is inherent in the process of curing the material because the material reaches a gel state before it reaches a final cured state.

To further clarify the teaching of the second material having a lower adhesive and adhesion property than the first material, it is noted that both the first and the second material have an adhesive and adhesion property at the chip surfaces to which they are attached. In addition, the figures of Ameen are not limited to an absolute frame of reference or otherwise limited to a particular orientation, and in the frame of reference wherein the integrated circuit is below the substrate, the second material has a positionally lower adhesive and adhesion property than the first material at the chip surfaces to which they are attached.

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ameen as applied to claim 8, and further in combination with Bouras (5906682).

Ameen does not appear to explicitly teach wherein the substrate moves within an oven while the first underfill material flows between the integrated circuit and the substrate.



Nonetheless, at column 2, lines 42-67; column 3, lines 61-65; column 4, lines 36-40 and 61-65; column 7, lines 3-32; and column 8, line 57 to column 9, line 11, Bouras teaches wherein a substrate moves within an oven while a first underfill material flows between an integrated circuit and a substrate. Furthermore, it would have been obvious to combine the invention of Bouras with the invention of Ameen because it would enable the oven-curing of Ameen.

In the alternative, claims 7, 8, 10-14 and 31-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ameen as applied to claims 7, 8, 10-14 and 31-35 supra, and further in combination with applicant's admitted prior art.

As applied supra, Ameen teaches the second material having a lower adhesive and adhesion property than the first material however, Ameen does not appear to literally teach these limitations.

Notwithstanding, Ameen teaches that the first underfill material and second fillet material are epoxy, and in the specification at page 8, line 19 to page 9, line 2, and the response filed 5-23-02, applicant admits as prior art an epoxy underfill material SEMICOAT 5230JP, and an epoxy fillet material SEMICOAT 122X. In addition, the particular claimed adhesion property is an inherent property of the prior art materials.

Moreover, it would have been obvious to combine prior art materials with the process of Ameen because it would provide epoxy underfill and fillet materials. To further clarify the teaching that SEMICOAT 5230JP and SEMICOAT 122X are prior art, applicant's admission that these trademarked materials were in use by another at the time of filing of the instant application is prima facie evidence that the materials are prior art.

Applicant's amendment and remarks filed 7-21-3 have been fully considered, and are adequately addressed by the rejections supra.

This Office action has an attached requirement for information under 37 CFR 1.105. A complete reply to this Office action must include a complete reply to the attached requirement for information. The time period for reply to the attached requirement coincides with the time period for reply to this Office action.

The art made of record and not applied to the rejection is considered pertinent to applicant's disclosure. It is cited primarily to show inventions similar to the instant invention.

***Any telephone inquiry of a general nature or relating to the status (MPEP 203.08) of this application or proceeding should be directed to Group 2800 Customer Service whose telephone number is 703-306-3329.***

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Any telephone inquiry concerning this communication or earlier communications from the examiner should be directed to David E. Graybill at (703) 308-2947. Regular office hours: Monday through Friday, 8:30 a.m. to 6:00 p.m.

The fax phone number for group 2800 is (703) 872-9306.

A handwritten signature in black ink, appearing to read 'D E Graybill', is positioned above the printed name.

David E. Graybill  
Primary Examiner  
Art Unit 2827

D.G.

10-Oct-03